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Darwin and after Darwin. Volume III. Post-Darwinian questions: Isolation, Physiological Selection. By the late GEORGE JOHN ROMANES, Honorary Fellow of Gonville and Caius College, Cambridge. Chicago, The Open Court Publishing Company, 1897.—pp. viii, 181.

Of the six chapters which constitute this volume the first two on "Isolation" and the last on "The History of Opinion on Isolation," were in type at the time of the author's death. The editor, Mr. Lloyd Morgan, has made no important alterations in these chapters, but holds himself responsible for the selection and arrangement of all that is contained in the other three. The work of editing has been well done and the book, as a whole, is an interesting and valuable contribution to post-Darwinian literature.

The thesis of this volume is that "Isolation is one of the most important principles that are concerned in the process of organic evolution." "Equalled only in its importance by the basal principle of Heredity and Variation, this principle of Isolation constitutes the third pillar of a tripod on which is reared the whole superstructure of organic evolution." By 'isolation' the author understands the prevention of indiscriminate intercrossing, whether this be due to geographical barriers, sexual selection, instinctive preferences, or to any other of the numerous means whereby isolation of species may be secured. The importance of isolation is evident from the fact that so long as there is free intercrossing, heredity cancels variability and leads to uniformity of type. There are two forms of isolation of such immeasurable importance that were it not for their virtually ubiquitous operation the process of organic evolution could never have begun. These are sexual incompatibility, or physiological selection, and natural selection. If sexual incompatibility did not exist, if the bar of sterility were removed which now isolates all the species of a genus, these species, if not otherwise prevented from intercrossing, would in time become blended into a single type. As regards natural selection it may seem paradoxical to classify it as a form of isolation. That this is the most accurate way of viewing it, however, is evident when we reflect that it is a process by which the fittest are prevented from crossing with the less fit by the elimination of the latter. It is, therefore, less fundamental as a factor of organic evolution than the principle of isolation in general. Natural selection differs from all the other known forms of isolation in that it has exclusive reference to adaptations; it differs from most of the other forms of isolation in that of itself it can never lead to polytypic but only to monotypic evolution. It can give rise to *transformation* of characters in a single line, but it cannot give rise of itself to any *divergence* of character in ramifying lines. This follows necessarily from the nature of the principle. It acts by destroying the unfit and it does not by itself prevent inter-breeding among the survivors. Hence if no other form of isolation is present, the average character of 'the fittest' will assert itself. A new type will be produced, but not diverging types.

Other arguments against the view that natural selection is a sufficient explanation of the origin of species, are adduced in the chapters which are devoted to the defence of the principle of physiological selection. The latter principle may be briefly outlined as follows : The most variable part of an organism is the reproductive system, and the variations may involve either increased or diminished fertility. If the variant, while showing some degree of infertility with the parent form, continues to be as fertile as before when mated with similar variants, there is no reason why such differential fertility should not be perpetuated. This suggestion enables us to regard many, if not most, species as the records of variations in the reproductive systems of their ancestors. When variations of a more useful kind occur in any of the other parts of organisms, they are as a rule immediately extinguished by intercrossing. But whenever they arise in the reproductive system in the way here suggested, they tend to be preserved as new natural varieties or incipient species. At first the difference could only be in respect to the reproductive systems, but eventually on account of independent variation other differences would supervene, and the variety would take rank as a true species. It is evident that this theory, if established, would solve many difficulties, and it must be admitted that the author makes out a strong case in favor of his position. He points out, for instance, that the necessity of physiological selection for the *maintenance* of existing specific differentiation cannot be denied ; for if the isolation which it implies were suddenly abolished between two allied species occupying a common area they would sooner or later become fused into a common type—if we suppose, of course, that no other form of isolation were present. "Why, then," he asks, "should it be regarded as a 'Darwinian heresy' to regard physiological selection as an important factor in the *attainment* of specific differentiation ?" It is important to notice in conclusion that while the author limits the range of Natural Selection he thereby justifies and strengthens its claim to be regarded as an essential factor in organic evolution. This is not the least important aspect of his general position.

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Animal Intelligence. By EDWARD L. THORNDIKE. Monograph Supplement of the Psychological Review, II, 4. New York, The Macmillan Co., 1898.—pp. 109.

It has long been agreed among psychologists that animal psychology is one of the most poorly developed and unsatisfactory branches of the science. Mr. Thorndike has gone a long way to remedy its defects, to substitute experiment for observation, and to apply in practice the law of parsimony that has been universally approved in theory, but in theory only. The immediate problem was to study the function of association and imitation in the animal mind, and to determine whether concepts or more complex processes were to be found there. Experiments were made upon cats, dogs, and chicks. Hungry cats and dogs were confined in cages, the doors of which could be opened by pulling a string, turning a button, or some